

APPENDIX V

FILTER INTERACTION WITH LIP MUCOSA

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A. Introduction

The three aspects covered were:

1. The videotapes of intra oral viewing, which by the use of a fiberoptic system demonstrated the interaction between the human lips and filter end in both "normal" and "abnormal" smoking - Abnormal smoking is caused by the design of the Puff Parameter Analyzer, hence forth termed the P.P.A. device.
2. A brief explanation of the anatomical variation in the oral area to better understand (a) the mechanism of smoking and (b) how these variables can effect measurements during experimental procedures.
3. The P.P.A. device and our concerns regarding its use as a means of measuring air dilution.

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### B. Video Tape Viewing

The first tape demonstrated the interaction of the lip mucosa to the filter end from both posterior and lateral viewing angles. Obstruction of the vents was not obvious.

The second tape enabled viewing of the limited surface area of the filter available to the lips when the P.P.A. device was used. This resulted in an observable alteration in the interaction between lips and filter end causing excessive mucosal coverage of the filter end.

### C. Anatomical Variations

1. By use of 3 color slides, the 3 types of dental occlusion, Class I, II, and III were demonstrated.
2. A slide of the musculature in the facial area illustrated the composition of the orbicularis oris - a sphincter like muscle - which through its innervation from the VIIth cranial nerve, the facial nerve, contracts to form a seal around the filter.

Through demonstration, each attendee was able to experience the different pressures elicited in the oral area when swallowing and sucking. The downward movement of the lower jaw to form a negative pressure, which enables smoke intake into the mouth, was also demonstrated.

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The nervous system connection between the higher brain centers, hypothalamus, and facial nerve were discussed to stress the importance of behavioral effects on measurement in an experimental environment.

The Vth nerve, the trigeminal nerve, being the necessary nerve of the facial area, is concerned with proprioceptive sensation in the tongue, lips and to a lesser extent the teeth. This sensation especially strong on the vermillion border of the lips and in the fingers is important for filter insertion depth perception. In smoking with the P.P.A. device, the important role of the fingers is lost.

Slides were used to demonstrate anatomical variation in the lips and to introduce terms of importance; e.g., inter-labial gap, incompetent lips, muscle tone, normal and abnormal paths of closure of the lower jaw and lips. These variations, especially in the Class II person, result in varied surface area contact and pressure between the lips and filter.

#### D. P.P.A. Device

Slides demonstrated how the decreased available surface area of the filter, when using the device, limits the insertion depth thereby altering the lip to filter end relationship. This altered relationship, together with the awkwardness of the device, behaviourable influences, and artificiality of smoking affect the ventilation system of the Barclay filter. Unfavorable abutment of the

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lips behind the filter, angulation of filter between the lips, increased base line lip pressure, reactive inward pressure, increased pressure directed towards the end of the filter due to the decreased surface area on the filter are the major problems which arise in testing with a device like the P.P.A.

#### Conclusion

1. Fiber optic studies in 20 real Barclay smokers did not demonstrate any obvious occlusion of the filters' vents.
2. The P.P.A. device causes interference with the Barclay ventilation system.
3. This interference can be further exaggerated by anatomical variations, especially in the Class II patient.
4. For these reasons, extrapolations from laboratory measurements using the P.P.A. to measure tar delivery are unreliable and misleading.

A more valid approach to measuring smoker-cigarette interaction is the consideration of the pharmacokinetic fate of nicotine in the smoker and the use of cotinine as a marker in plasma.

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